Instruction Manual

JOHN FLUKE MFG. CO., INC.

ELECTRONICS FOR INDUSTRY

INSTRUMENTS / COMPONENTS

MODEL 803B

AC/DC DIFFERENTIAL VOLTMETER

Serial No. 123 and above

JOHN FLUKE MFG. CO., INC.
P. O. Box 7428 Seattle 33, Washington

Preliminary Operating Instructions

for

MODEL 803B

July 3, 1962

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SECTION I

SPECIFICATIONS

1-1. AS A PRECISION POTENTIOMETER

DC ACCURACY:

±0.05% of input voltage from 0.1 to 500 V DC
±(0.05% + 50 uv) below 0.1 V DC

AC ACCURACY:

Input Voltage	Basic AC Accuracy from 20cps to 10kc	Low Frequency AC Accuracy	
		from 10cps to 20cps	from 5cps to 10cps
0.5 to 500 0.001 to 0.5	±0.2% ±(0.2% + 25uv)	±0.5% ±(0.5% + 25uv)	±3% ±(3% + 25uv)

INPUT VOLTAGE RANGES:

DC:	AC:
50-500	50-500
5-50	5-50
0.5-5	0.5-5
0-0.5	0.001-0.5

NULL VOLTAGE RANGES:

DC:	AC:
10-0-10	100-0-100
1-0-1	10-0-10
0.1-0-0.1	1-0-1
0.01-0-0.01	0.1-0-0.1
	0.01-0-0.01
	0.001-0-0.001

INPUT IMPEDANCE AT NULL:

DC: Infinite on all ranges
AC: 1 megohm, 35 uuf on 50 and 500 VAC range
1 megohm, 50 uuf on 0.5 and 5 VAC range

MAXIMUM VOLTAGE DIAL RESOLUTION:

10 microvolts

MAXIMUM METER RESOLUTION:

DC: 50 microvolts
AC: 5 microvolts

1-2. AS A VACUUM TUBE VOLTMETER

ACCURACY: ±3% of full scale

BASIC INPUT VOLTAGE RANGES:

500, 50, 5, and 0.5

ADDITIONAL RANGES (Using null ranges with voltage dials set to zero):

DC: 10, 1, 0.1, and 0.01 volts
AC: 100, 10, 1, 0.1, and 0.01 volts

DC INPUT RESISTANCE: 50 megohms on basic ranges

AC INPUT IMPEDANCE:

1 megohm, 35 uuf on 500 and 50 volt ranges
1 megohm, 50 uuf on 5 and 0.5 volt ranges

1-3. GENERAL SPECIFICATIONS

REFERENCE STABILITY:

±0.0025% for a 10% change in line voltage
±0.005% per hour after a 30 minute warmup

OPERATING TEMPERATURE RANGE:

Within DC accuracy specifications from 40°F to 105°F
Within AC accuracy specifications from 55°F to 95°F derated at 0.005%/°F outside these limits to 35°F to 110°F

INPUT POWER:

115/230 volts AC ±10%, 50 - 70 cps, 75 watts

SIZE:

Cabinet - 13" high, 9-1/2" wide, 16" deep
Rack - 7" high, 19" wide, 15-1/2 deep

WEIGHT:

Cabinet - 27-1/2 lbs.
Rack - 25 lbs.

SECTION II

OPERATING INSTRUCTIONS

2-1. GENERAL

a. The instrument is normally supplied for use on 115 volts. Upon request, instruments are supplied for 230 volt operation. If it becomes desirable to convert from one mode of operation to the other, refer to the transformer connection instruction decal on the back of cabinet models or on the rear of the cover in rack models.

b. Immediately upon receipt, thoroughly inspect for any damage that may have occurred in transit. If any damage is noted, follow the instructions outlined on the warranty page at the back of this manual.

2-2. CONTROLS AND TERMINALS

a. Line power is controlled by a toggle switch on both cabinet and rack model instruments.

b. The OPERATE-CALIBRATE switch remains in the OPERATE position at all times except when it is necessary to calibrate the internal 500 V DC reference voltage. When held in the CALIBRATE position, a representative sample of the reference voltage is compared to the voltage of an internal standard cell, or a Zener power supply in the 803B/AG models, and any difference appears as an input to the null detector.

c. The CALIBRATE control varies the output of the 500 volt DC reference supply. When the OPERATE-CALIBRATE switch is turned to CALIBRATE, the reference supply is accurately set by adjusting the CALIBRATE control for zero meter deflection.

d. The AC-DC polarity switch selects the AC, + DC, or - DC mode of operation. With this switch in the positive position, the polarity of the upper input binding post is positive with respect to the lower input binding post.

e. The RANGE switch selects maximum input voltage ranges of 500, 50, 5, and 0.5 volts. It also indicates the AC NULL MULT for each range position.

f. The NULL switch is placed in the VTVM position to determine the approximate value of unknown voltage prior to differential measurements. Four null

switch ranges of 10, 1, 0.1, and 0.01 volts are used for differential measurements. For the DC mode, the null ranges represent full scale differences between the unknown voltage and the amount of precision internal reference voltage that is set on the voltage dials. For the AC mode, the null range used times the applicable AC Null Multiplier, indicated by the range switch, represents the full scale difference between the unknown voltage and the amount set on the voltage dials.

g. The A, B, C, D, and E voltage dials provide an in-line readout of the amount of reference voltage necessary to null the unknown voltage. Illuminated decimal points adjacent to the voltage dials change as the voltage range of the instrument is changed.

h. The unknown voltage is connected to the instrument across two insulated binding posts. A third (chassis) binding post is provided for grounding purposes. The lower signal input binding post is connected to the chassis ground post through a 0.47 UFD capacitor. These posts may be shorted if desired; however, the instrument is equipped with a 3-wire line cord with the third wire fastened to the chassis, and the external circuit should be checked for conflicts in grounding.

i. Two binding posts on the rear panel are provided for attaching a recorder to monitor voltage excursions. An output level potentiometer above the binding posts varies the output level from approximately 0 to 20 millivolts at full scale meter deflection.

j. The meter indicates the approximate voltage when the 803B is in the VTVM mode and the difference between unknown and internal reference voltage when the 803B is in differential mode. The upper scale, 500-0-500,is used when the NULL switch is set to VTVM. At all other times, the lower scale, 1-0-1, is used.

2-3. ZEROING INSTRUCTIONS

From time to time, it may be necessary to adjust the internal meter zero control. This will normally be done at somewhat more frequent intervals than complete instrument calibration. Proceed as follows:

a. Mechanically zero the meter with the adjustment screw on the front of the meter case. If the instrument is in the case, it must be shut off for at least three minutes prior to this adjustment. If out of case, another method would be to short out the meter terminals prior to zeroing.

b. Set power switch to ON and allow a 20 minute warmup period.

c. Set RANGE switch to 5 or 0.5 volts, voltage readout dials to zero, and NULL switch to 0.01 volt.

d. Adjust R227, null detector ZERO ADJ, for zero meter deflection. This control may be reached through the ventilation holes in the cabinet model. In the rack model, an identified access hole is provided on the rear panel.

2-4. PRELIMINARY OPERATION

The following procedure prepares the voltmeter for operation:

a. Connect power plug to a 115 volt AC power source. If instrument has been wired for 230 volt operation, connect to 230 volts AC.

NOTE

The round pin on polarized three-prong plug connects instrument case to power system ground. Use three-to-two pin adapter supplied with instrument when connecting to a two-contact receptacle. For personnel safety, connect short lead to a suitable ground.

b. Set controls on 803B voltmeter as follows:

RANGE	500 volts
NULL	VTVM
AC-DC polarity	+ (positive)
all voltage readout dials	0 (zero)
power	ON

c. After a warmup period of at least ten minutes, advance OPERATE-CALIBRATE switch against spring tension to CALIBRATE, and adjust internal 500 volt DC reference supply with CALIBRATE control for zero meter deflection. Release OPERATE-CALIBRATE switch.

2-5. OPERATION AS A DC DIFFERENTIAL VOLTMETER

a. After completing preliminary operation, connect unknown voltage to input binding posts. If one side is grounded, always connect it to the lower input post (middle post).

b. Turn RANGE switch to lowest range that will allow an on-scale reading and note approximate value of unknown voltage as indicated on upper meter scale.

c. If meter reads to the left, turn AC-DC polarity switch to the negative position. The meter needle will deflect to the right. This is because polarity of unknown voltage is negative.

d. Noting the position of illuminated decimal light, set five voltage readout dials to approximate voltage determined in step b. For example, if approximate voltage is 35 volts, the decimal light between the B and C voltage readout dials will be illuminated. Therefore, set A dial to 3, B dial to 5, and C, D, and E dials to 0.

e. Set NULL switch to successively more sensitive null ranges, as indicated in figure 2-1, and adjust voltage readout dials for zero meter deflection in each null position. When the meter needle indicates to the right, the voltage under measurement is greater than the voltage set on the voltage readout dials. When the indication is to the left, the voltage is less than that set on the readout dials.

INPUT VOLTAGE RANGE	*RECOMMENDED NULL SETTING
50-500	10 then 1 (then 0.1 for voltages from 50 to 100 volts)
5-50	1 then 0.1 (then 0.01 for voltages from 5 to 10 volts)
0.5-5	0.1 then 0.01
0-0.5	0.1 then 0.01

*Any null range may be used with any input voltage range; recommended settings are those most useful.

Figure 2-1. RECOMMENDED NULL SETTINGS

f. Read unknown voltage directly from the five voltage readout dials.

2-6. OPERATION AS AN AC DIFFERENTIAL VOLTMETER

a. After completing preliminary operation, set AC-DC polarity switch to AC.

b. Connect unknown AC voltage to input binding posts.

c. Turn RANGE switch to lowest range that will allow an on-scale reading and note approximate value of unknown voltage as indicated on upper meter scale.

d. Noting the position of illuminated decimal light, set five voltage dials to approximate voltage determined in step c. For example, if approximate voltage is 35 volts, the decimal light between the B and C voltage dials will be illuminated. Therefore, set A dial to 3, B dial to 5, and C, D, and E dials to 0.

e. Set null switch to 0.1 and then 0.01 volt, adjusting voltage dials for zero meter deflection in each position.

f. Read unknown voltage from the five voltage readout dials.

2-7. OPERATION AS A CONVENTIONAL VTVM

If it is desired to use the instrument as a VTVM only, additional ranges can be made available by converting the NULL ranges to VTVM ranges. This is made possible by setting the voltage readout dials to zero. Proceed as follows:

a. Perform preliminary operation procedures as stated in paragraph 2-4.

b. Consult figure 2-2, and select full scale voltage deflection desired. If the approximate value of the voltage to be measured is unknown, select the 500 volt range initially.

c. Set AC-DC polarity switch, RANGE switch, NULL switch, and voltage dials as indicated for the range selected.

d. Connect voltage to be measured to input binding posts. Deflection to the right indicates that an unknown DC voltage is of positive polarity. An unknown AC voltage will always cause deflection to the right.

e. Read voltage from upper or lower scale as listed in figure 2-2.

Full-Scale Deflection	AC-DC Polarity Switch	Range Switch	Null Switch	Voltage Readout Dials	Meter Scale
DC:					
500-0-500	DC	500	VTVM	No effect	Upper
50-0-50	DC	50	VTVM	No effect	Upper
5-0-5	DC	5	VTVM	No effect	Upper
0.5-0-0.5	DC	0.5	VTVM	No effect	Upper
10-0-10	DC	No effect	10	All zero	Lower
1-0-1	DC	No effect	1	All zero	Lower
0.1-0-0.1	DC	No effect	0.1	All zero	Lower
0.01-0-0.01	DC	No effect	0.01	All zero	Lower
AC:					
0-500	AC	500	VTVM	No effect	Upper
0-50	AC	50	VTVM	No effect	Upper
0-5	AC	5	VTVM	No effect	Upper
0-0.5	AC	0.5	VTVM	No effect	Upper
0-100	AC	500	1	All zero	Lower
0-10	AC	500	0.1	All zero	Lower
		50	1		
0-1	AC	500	0.01	All zero	Lower
		50	0.1		
		5	1		
0-0.1	AC	50	0.01	All zero	Lower
		5	0.1		
		0.5	1		
0-0.01	AC	5	0.01	All zero	Lower
		0.5	0.1		
0-0.001	AC	0.5	0.01	All zero	Lower

Figures 2-2. VTVM RANGES

2-8. MEASUREMENT OF VOLTAGE EXCURSIONS ABOUT A NOMINAL VALUE

a. After completing preliminary operation as stated in paragraph 2-4, set AC-DC polarity switch to desired position.

b. Connect voltage to be observed to input binding posts. If meter reads to the left, the voltage being measured is negative DC; set polarity switch to the negative position in this case. This will cause meter pointer to deflect to the right.

c. Set RANGE switch to lowest range which will give an on-scale meter indication and note nominal value of voltage indicated.

d. Set the five voltage readout dials to nominal voltage.

e. Turn NULL switch to lowest position that will allow voltage excursions to remain on scale.

f. Read voltage excursions from meter. Note that full scale right and left meter deflections are equal to the NULL voltage setting for DC measurements. For AC measurements, full scale right and left meter deflections are equal to the NULL voltage setting multiplied by the AC NULL MULT indicated by the RANGE setting.

2-9. USE OF 803B WITH A RECORDER

Recorder output binding posts and an output level control are provided on the 803B for monitoring the excursions of an unknown voltage from the voltage indicated by the voltage dial settings. If the leakage resistance between the recorder and ground is less than 10,000 megohms, the accuracy of the 803B will be impaired. Also, both input posts of the recorder should be able to stand 500 volts DC to ground. Therefore, the John Fluke Model A-70 Potentiometric Recorder (manufactured by the Texas Instrument Co.) is recommended for this application. Set up the recorder as follows:

a. Connect A-70 recorder to 803B voltmeter with teflon leads as shown in figure 2-3.

NOTE

Do not ground either of the 803B output terminals or either of the A-70 input terminals. If any of these terminals are grounded, current will be drawn from the 803B Kelvin-Varley Voltage divider and the accuracy of the 803B will be completely destroyed.

b. After connecting the recorder, perform preliminary operation as stated in paragraph 2-4.

c. Check for excessive leakage as follows:

(1) Connect a voltage to the input of the 803B and differentially measure its potential in a recommended null range.

(2) Alternately connect and disconnect the recorder leads from the output terminals of the 803B while noting the meter needle deflection. More than one-quarter of a small scale division deflection indicates that excessive leakage has been introduced by the recorder. This will impair the accuracy of the 803B voltmeter.

(3) Disconnect the voltage.

d. After the leakge test has been successfully completed, short the input terminals of the 803B.

e. Set switches on the 803B voltmeter as follows:

RANGE	50
NULL	10
voltage read-out dials	10.000

The 803B meter will indicate full scale deflection. This provides up to a maximum of approximately 20 millivolts at the output terminals depending on the setting of the output level control.

f. Turn the output level control until the recorder deflection obtained is that desired to correspond to full scale deflection of the 803B.

g. Remove the short from the input terminals of the 803B. The 803B and the recorder are now ready for combined use. Proceed as instructed under paragraph 2-8.

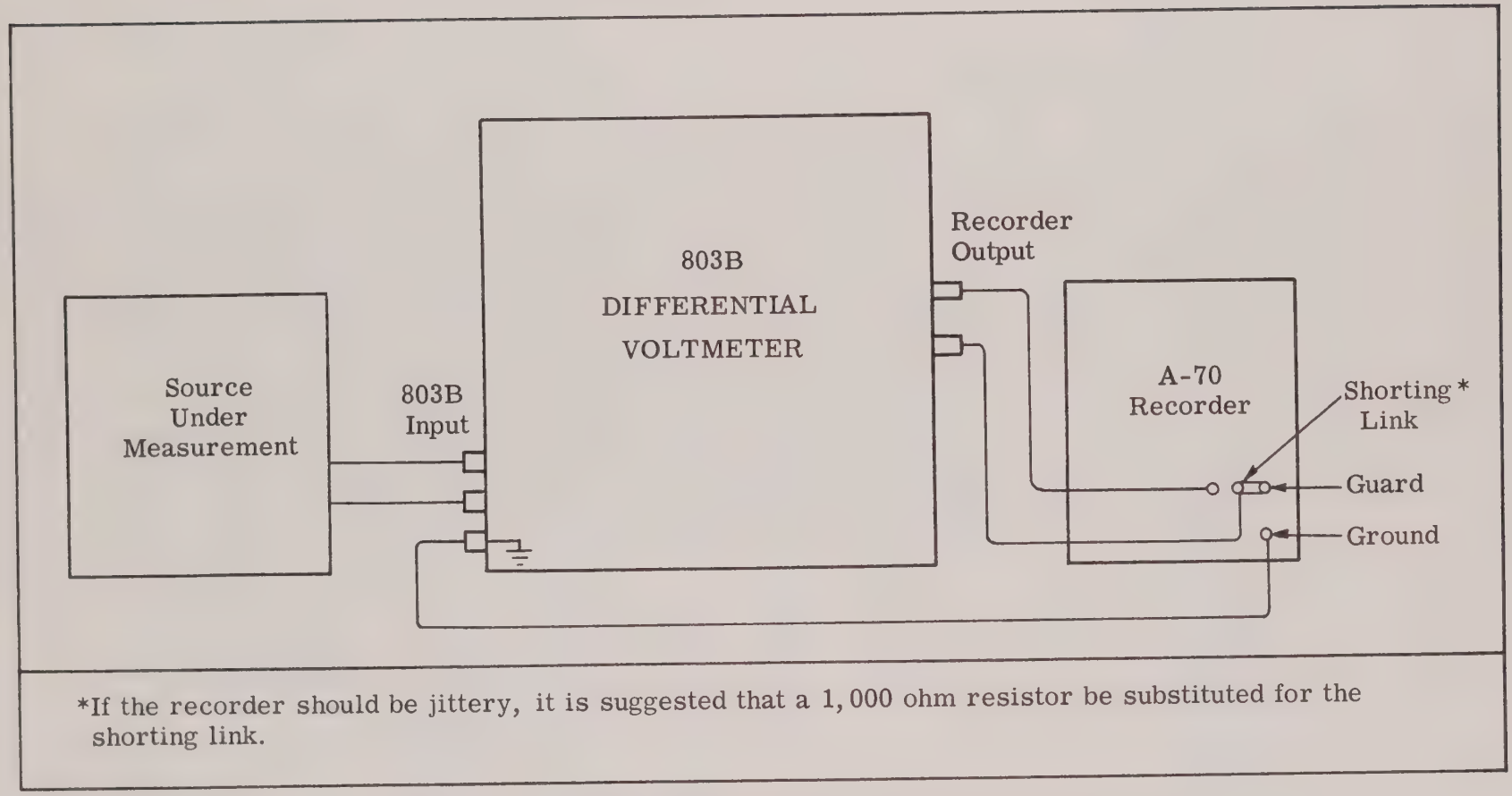


Figure 2-3. RECOMMENDED CONNECTION DIAGRAM

2-10. MEASUREMENT OF HIGH RESISTANCES

One of the important features of the 803B voltmeter is its ability to be used as a megohmmeter for rapidly measuring high resistances from 1 megohm to 500,000 megohms. The following equation may be used to compute the resistance in megohms of an unknown connected to the input binding posts:

$$R_X = 10\left(\frac{E}{E_m} - 1\right) \text{ megohms,}$$

where:

R_X = unknown resistance in megohms

E = voltage indicated by voltage readout dials

E_m = voltage indicated on meter

10 = megohms of input resistance of VTVM circuit on 10, 1, and 0.1 null range.

When connecting the unknown resistance to the input terminals, use short isolated leads to prevent measuring leakage resistance between the leads.

a. FROM 1 MEGOHM TO 500 MEGOHMS. For rapid measurement of resistances from 1 megohm to 500 megohms, proceed as follows:

(1) Perform preliminary procedure as stated in paragraph 2-4.
(2) Set RANGE switch to 500 and NULL switch to 10.
(3) Connect unknown resistance between input terminals.
(4) Adjust voltage readout dials for full scale meter deflection.
(5) Subtract 10.00 from the amount set on the voltage readout dials to find the resistance of the unknown in megohms.

b. FROM 500 MEGOHMS TO 5000 MEGOHMS. For rapid measurements, of resistances from 500 to 5000 megohms, proceed as follows:

(1) Perform preliminary procedure as stated in paragraph 2-4.
(2) Set RANGE switch to 500 and NULL switch to 1.
(3) Connect unknown resistance between input terminals.
(4) Adjust voltage readout dials for full scale meter deflection.
(5) Subtract 1.00 from the amount set on the voltage readout dials and multiply the result by 10 to find the resistance of the unknown in megohms.

c. FROM 5,000 MEGOHMS TO 50,000 MEGOHMS. For rapid measurements, of resistances from 5,000 to 50,000 megohms, proceed as follows:

(1) Perform preliminary procedure as stated in paragraph 2-4.
(2) Set RANGE switch to 500 and NULL switch to 0.1.
(3) Connect unknown resistance between input terminals.
(4) Adjust voltage readout dials for full scale meter deflection.
(5) Multiply the amount set on the voltage readout dials by 100 to find the resistance of the unknown in megohms.

d. FROM 50,000 MEGOHMS TO 500,000 MEGOHMS. To determine the value of an unknown resistance between 50,000 megohms and 500,000 megohms, proceed as follows:

(1) Perform preliminary procedure as stated in paragraph 2-4.
(2) Set RANGE switch to 500 and NULL switch to 0.1.
(3) Connect unknown resistance between input terminals.
(4) Adjust voltage readout dials for a convenient meter deflection.
(5) The resistance in megohms may be calculated by substituting the meter reading in volts (E_m, 0 to 0.1 volt on bottom scale) and the voltage readout dial setting (E) into the following equation:

$$R_X = 10 \frac{E}{E_m} \text{ megohms}$$

2-11. NOTES ON MEASURING VOLTAGES

a. ADJUSTMENT OF 500 VOLT SUPPLY. The 500 volt DC reference supply may be adjusted (paragraph 2-4, step c) at any time deemed necessary without heed to the position of the switches and without removing any input or output connections. However, until the instrument has warmed up to an equilibrium temperature (about 1/2 hour), it should be adjusted prior to each specific measurement for best accuracy. When making prolonged measurements, allow one hour warmup time to insure that 500 volt reference supply does not shift during the final warmup phase.

b. GROUND LOOP PRECAUTIONS. Ground loop currents should be avoided to assure accuracy when making measurements. Potential differences are often found at different points on power system grounds. When this is the case, current may flow from the power system ground through the 803B and the equipment under measurement and back to the power system ground. To avoid this when system being measured is grounded, do not connect input binding posts to chassis ground post.

c. RECOMMENDED NULL RANGES FOR DC MEASUREMENTS. Certain null ranges are recommended for use with each setting of the RANGE switch for the following reasons. With the RANGE switch at 500 volts, the last voltage readout dial (E) changes the reference voltage in steps of 0.01 volt.

Therefore, the unknown voltage would have to be an exact multiple of 0.01 volt if a null is to be obtained on the 0.1 or 0.01 volt NULL range. Furthermore, it is unlikely that an unknown voltage of a few hundred volts will be stable within 10 millivolts. Finally, the regulation of the reference supply is approximately 0.005% of 0.025 volt for a 20% change in line voltage. Although this is more than addequate when the instrument is used in the recommended way, a badly fluctuating line voltage may cause the 803B to meter the regulation of its own 500 volt reference supply. For example, when measuring 500 volts a line change of 10% may cause the 500 volt reference supply to change as much as 12.5 mv. Although this is small, the 803B will indicate full scale for a change as little as 100 mv or 10 mv if attempting to use the 0.1 or 0.01 null ranges.

d. EFFECT OF AC COMPONENTS ON DC MEASUREMENTS. An AC component of several times the unknown DC may be present on the unknown and the 803B will always indicate well within the specifications for frequencies over a few hundred cycles. An AC component may have an adverse effect if it is of a low frequency or if it has a frequency that is a multiple or submultiple of the chopper frequency. A double section low pass filter (R201, C201, R202, and C202) is used at the input of the null detector to reduce any AC present on the DC being measured. At lower frequencies, this low pass filter is less effective and the magnitude of the AC component is more significant. When the frequency is very close to a multiple or submultiple of the chopper frequency (approximately 60 cycles), the meter needle will oscillate at the difference frequency. For example, a 60 cycle AC voltage that is 5% of the input voltage will cause an error of approximately 0.01% which is well within the specifications. At low frequencies other than 60 cycles, a larger AC component can be tolerated. Also, since the input attenuation is less for the more sensitive null settings, the accuracy may be effected only on the more sensitive null settings. If AC components that affect the accuracy are every encountered, additional filtering will be required. For an AC of a single frequency, a twin-T filter is effective and has the advantage of low total series resistance. For an AC variable frequency, an ordinary low pass filter may be used. In either case, high quality capacitors of high leakage resistance should be used.

e. MEASUREMENT OF NEGATIVE DC VOLTAGES. Because of a polarity switch, voltages which are negative with respect to ground as well as the more commonly encountered positive voltages may be measured with equal facility. If the upper input post is connected to the metal case or line ground, either at the 803B or at the source under measurement, the accuracy of the voltmeter may be reduced. However, with the polarity switch, the upper input post never has to be connected to ground. If the unknown voltage is grounded, always connect the grounded side to the lower input post (middle post) and use the polarity switch to obtain the proper result.

2-12. NOTES ON MEASURING AC VOLTAGES

a. ERRORS DUE TO DISTORTION. The AC to DC converter in the 803B is an average measuring device calibrated in RMS. The converter will put out a DC voltage that is proportional to 1.11 times the average value of the AC input voltage. Thus, if the input signal is not a true sinusoid, the 803B reading is probably in error because the ratio of RMS to average is usually not the same in a complex wave as in a sine wave. The magnitude of the error is dependent on magnitude of the distortion and on its phase and harmonic relationship with respect to the fundamental. Figure 2-4 indicates how the accuracy will be affected by various harmonics for different percentages of distortion. If the distortion present in the signal is composed of even harmonics and is less than 2%, the error between the 803B reading and true RMS is fairly minor. A larger error can occur if the distortion is composed of odd harmonics, especially the third harmonic. Note that for 2% of third harmonic distortion, the error in the reading could range from 0 to 0.687%.

b. ERRORS DUE TO GROUNDING. In the 803B there is a 0.47 uf capacitor connected from the lower input terminal (middle post) to chassis ground. If it is desired to make measurements where the voltage to be connected to the lower input terminal is not at ground potential, a line cord adapter must be used to isolate the 803B chassis from line ground. Otherwise, the 0.47 uf capacitor would place an AC load on the circuit being measured.

c. INTERNAL CONVERTER NOISE. When the instrument is shorted in the AC mode the converter may produce a residual noise output up to 100 uv. This noise voltage will cause an insignificant error as long as AC input signals of 1 mv or larger are applied to the instrument.

HARMONIC	% DISTORTION	%ERROR FROM TRUE RMS*	
		MAXIMUM NEGATIVE	MAXIMUM POSITIVE
Any even harmonic	0.1	0.000	0.000
	0.5	0.0001	0.000
	1.0	0.005	0.000
	2.0	0.020	0.000
Third harmonic	0.1	0.033	0.033
	0.5	0.168	0.167
	1.0	0.338	0.328
	2.0	0.687	0.667
Fifth harmonic	0.1	0.020	0.020
	0.5	0.101	0.099
	1.0	0.205	0.195
	2.0	0.420	0.380

*Error depends upon phase relationship between harmonic and fundamental, i.e. error can be any value between maximum positive and maximum negative, including zero.

Figure 2-4. PERCENT ERROR DUE TO HARMONIC DISTORTION

SECTION III

CALIBRATION

3-1. GENERAL

a. The 803B can be calibrated as often as deemed necessary. However, it is recommended that Zener diode models be calibrated every three months and standard cell models be calibrated every six months. For special applications where extreme accuracy is required, it may be desired to calibrate the instrument more frequenctly. Calibration should be accomplished in a draft-free area with ambient temperature of 72 (±3) ^{O}F for maximum accuracy under laboratory operating conditions.

b. The recommended equipment and method of connection for DC Differential Voltmeter calibration and AC to DC Converter calibration are shown in figure 3-1 and 3-2. The DC Differential Voltmeter calibration must be performed prior to AC to DC Converter calibration. Paragraph 3-2 describes the necessary preliminary calibration procedure and the recommended method of providing the DC and AC calibration voltages required. For DC Differential Voltmeter calibration, the Bureau of Standards will certify the standard cell to only 0.01%. However, the standard cell may be maintained to 0.002% if treated with care and not subjected to sudden temperature changes. For reasonable certainty of 0.002% cell accuracy, the certified value should be known to six places. Since the ESI voltage divider is accurate within ±0.005%, the overall DC calibration system accuracy is between 0 003% and 0.007%.

3-2. PRELIMINARY CALIBRATION PROCEDURE

a. Set 803B meter to zero with mechanical zero control.
b. Set switches on 803B as follows:

RANGE	500
NULL	VTVM
AC-DC polarity	+ (positive)
All voltage read-out dials	0 (zero)

c. Place 803B and all calibration test equipment in operation.

d. Allow all equipment to warm up until it reaches equilibrium temperature (at least 1/2 hour).

e. Set up the necessary equipment to provide DC voltages of 500, 50, 5, and 0.5 DC with an accuracy of at least 0.01%. The recommended equipment and method of connection is shown in figure 3-1. Proceed as follows:

(1) Set the proper standard cell voltage on the ESI divider.

(2) Apply 500 volts DC into the divider from a ℱ Model 301C or 301E power supply.

(3) Set ESI divider to 500 and zero galvanometer by varying the output of the power supply while depressing the coarse and then the coarse and fine push-button switch. Voltages of 500, 50, 5, and 0.5 volts DC (±0.01%) are made available at the output posts by merely changing the position of the voltage selector switch on the voltage divider.

f. Set up the necessary equipment to provide AC voltages of 500, 50, 5, and 0.5 volts AC with an accuracy of at least ±0.05% at frequencies of 400 cycles and 10 kilocycles, with less than 0.1% total harmonic distortion. The recommended equipment and method of connection is shown in figure 3-2. Proceed as follows:

(1) Adjust DC power supply voltage until differential voltmeter indicates RMS value of AC voltage required.

(2) Null output of DC supply with 540A internal adjustable reference voltage.

(3) Null 540A by adjusting AC oscillator output until it equals 540A reference voltage. The output of the Elin Oscillator now equals the required AC voltage.

3-3. DC DIFFERENTIAL VOLTMETER CALIBRATION

a. NULL DETECTOR CALIBRATION

(1) Connect chassis ground to line ground.

(2) Short meter terminals and zerometer with adjustment screw on the front of the meter case.

(3) Adjust null detector ZERO ADJ control R227 until meter indicates zero.

(4) Apply 500 volts DC to voltmeter.

(5) Adjust VTVM GAIN ADJ control R219 for full scale deflection.

b. 500 VDC REFERENCE SUPPLY CALIBRATION

(1) Measure reference supply voltage between pin 3 of V101 and negative binding posts.

(2) Center CALIBRATE control at its center of rotation.

(3) Adjust 500 V ADJ control R121 until reference supply is 500.0 (±0.2) volts.

c. 500 VDC REFERENCE SUPPLY ADJUSTMENT

(1) Set switches on 803B as follows:

RANGE	500
NULL	0.1
voltage read-out dials	499.910

(2) Apply 500 volts DC (±0.01%) to voltmeter.

(3) Null 803B meter by adjusting CALIBRATE control.

(4) Advance OPERATE-CALIBRATE switch against spring tension to CALIBRATE and null meter by adjusting REF CAL ADJ control R318.

d. 50 VDC RANGE DIVIDER CALIBRATION

(1) Set switches on 803B as follows:

RANGE	50
NULL	0.01
voltage read-out dials	49.9910

(2) Apply 50 volts DC (±0.01%) to voltmeter

(3) Null 803B meter by adjusting 50 V ADJ control R323.

e. 5 VDC RANGE DIVIDER CALIBRATION

(1) Set RANGE switch to 5 volt position.

(2) Apply 5 volts DC (±0.01%) to voltmeter.

(3) Null 803B meter by adjusting 5 V ADJ control R326.

f. 0.5 VDC RANGE DIVIDER CALIBRATION

(1) Set RANGE switch to 0.5 volt position.

(2) Apply 0.5 volts DC (±0.01%) to voltmeter.

(3) Null 803B meter by adjusting 0.5 V ADJ control R329.

This completes the DC differential voltmeter calibration.

3-4. AC to DC CONVERTER CALIBRATION

a. 0.5 VAC CONVERTER GAIN ADJUSTMENT

(1) Set switches on 803B as follows:

RANGE	0.5
NULL	0.01
AC-DC polarity	AC
Voltage read-out dials	.499910

(2) Apply 0.5 volts AC at 400 cycles to voltmeter.

(3) Adjust 0.5 V AC GAIN ADJ control R536 until the meter needle is within ±50 microvolts (1/2 major division) of null.

b. 0.5 VAC HIGH FREQUENCY ADJUSTMENT

(1) Apply 0.5 volts AC at 10 kilocycles to voltmeter.

(2) Adjust 0.5 VAC HF TRIM control C519 for a null.

c. 5 VAC CONVERTER GAIN ADJUSTMENT

(1) Set RANGE switch to 5 volt position.

(2) Apply 5 volts AC at 400 cycles to voltmeter.

(3) Adjust 5 VAC GAIN ADJ control R541 for a null.

d. 5 VAC HIGH FREQUENCY ADJUSTMENT

(1) Apply 5 volts AC at 10 kilocycles to voltmeter.

(2) Adjust 5 VAC HF TRIM control C504 for a null.

e. 50 VAC ATTENUATOR ADJUSTMENT

(1) Set RANGE switch to 50 volt position.

(2) Apply 50 volts AC at 400 cycles to voltmeter.

(3) Adjust 50 VAC ATTENUATOR control R503 for a null.

f. 50 VAC HIGH FREQUENCY ADJUSTMENT

(1) Apply 50 volts AC at 10 kilocycles to voltmeter.

(2) Adjust 50 VAC HF TRIM control C501 for a null.

g. 500 VAC ATTENUATOR ADJUSTMENT

(1) Set RANGE switch to 500 volt position.

(2) Apply 500 volts AC at 400 cycles to voltmeter.

(3) Adjust 500 VAC ATTENUATOR control R534 for a null.

h. 500 VAC HIGH FREQUENCY ADJUSTMENT

(1) Apply 500 volts AC at 10 kilocycles to voltmeter.

(2) Adjust 500 VAC HF TRIM control C523 for a null.

This completes the AC to DC converter calibration.

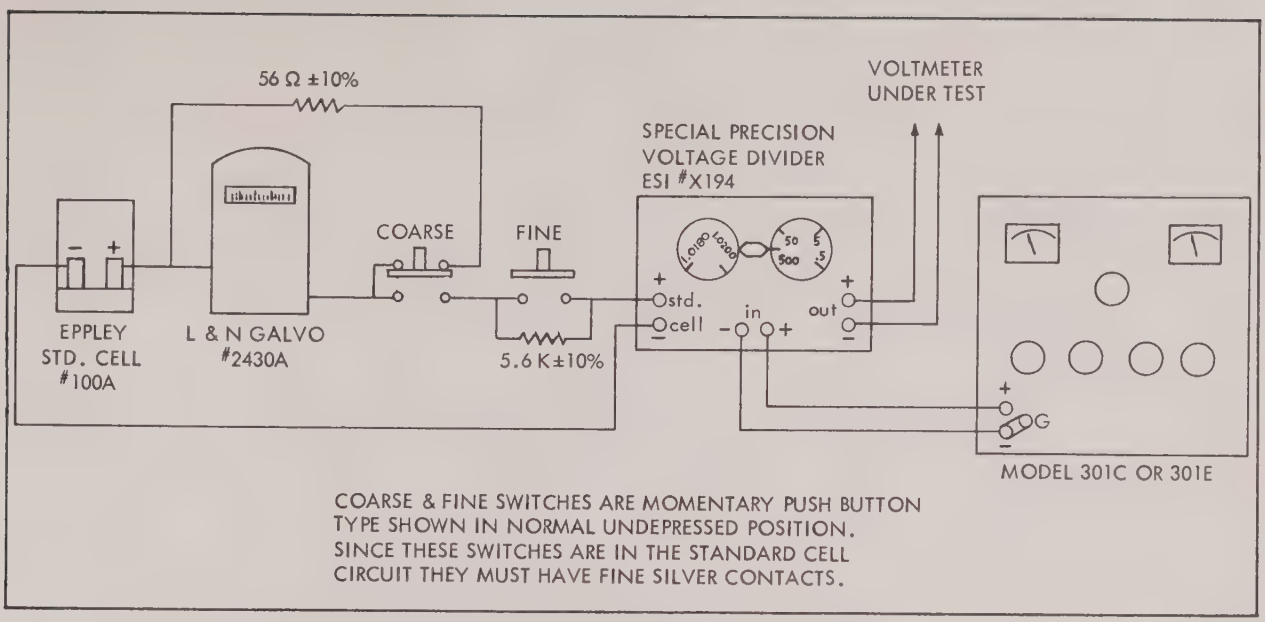


Figure 3-1. DC DIFFERENTIAL VOLTMETER CALIBRATION SET-UP

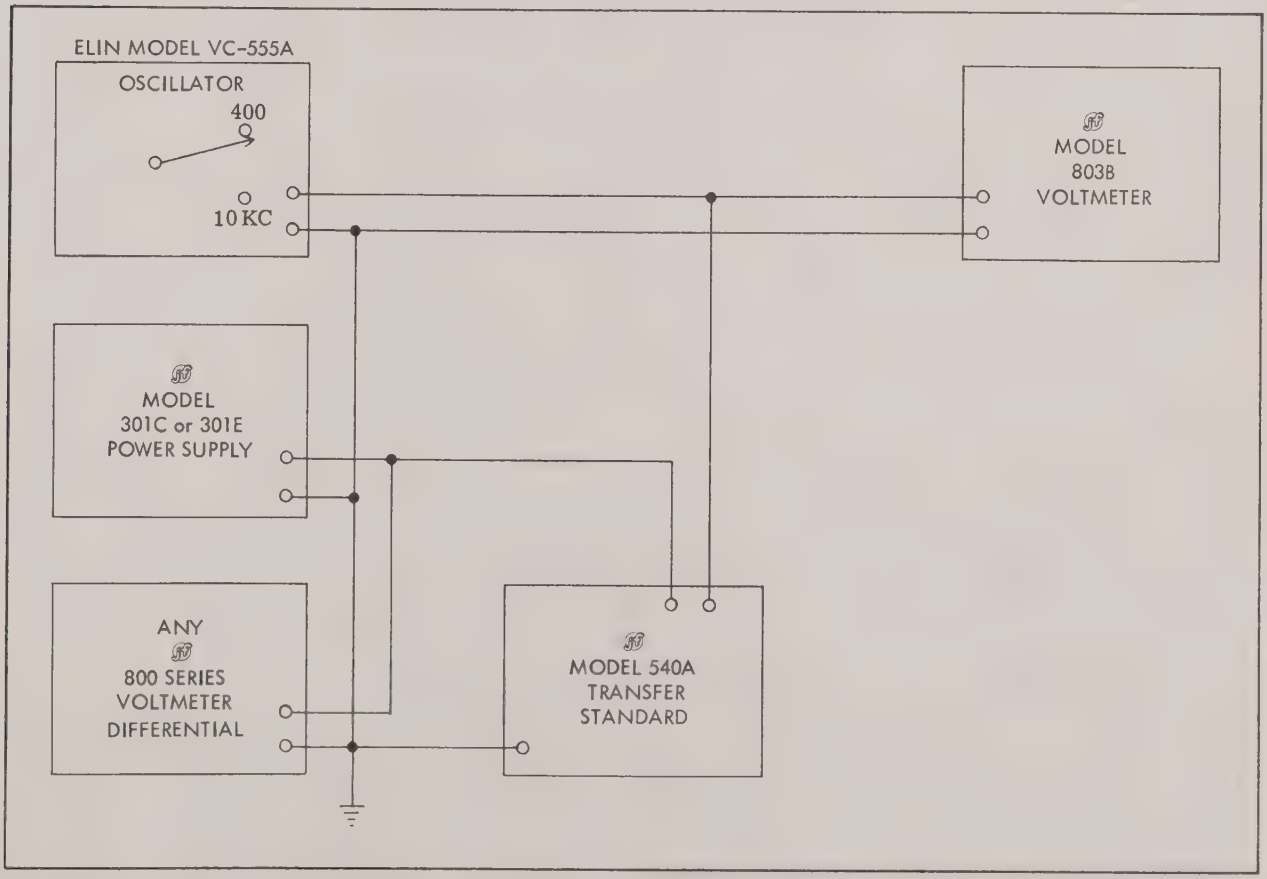


Figure 3-2. AC TO DC CONVERTER CALIBRATION SET-UP

SECTION IV

LIST OF REPLACEABLE PARTS

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
	Final Assembly	803B-509 803BR-509 803B/AG-509
	Front Panel Assembly	803B-435 803BR-407 803B/AG-435
	Rear Chassis	
J4, J5	Binding post, black	X219
	Binding post insulator, red	X217
F1	Fuse, 1.5 ampere, slow-blowing (for 115 volt operation)	F1-1/2A
F1	Fuse, 0.75 ampere, slow-blowing (for 230 volt operation)	F 3/4A
R1	Potentiometer, wirewound, 5K, 10%, 2W	P5KA
R3	Resistor, precision power, 49K, 1%, 7W, (803B/AG and 803BR/AG)	R49KW
Q3	Transistor, germanium, PNP, 2N301W	2N301W
	Null Detector Printed Circuit Board Assembly	803B-436
	Range Resistor Printed Circuit Board Assembly	803B-404 803BR-411 803B/AG-404
	Reference Supply Printed Circuit Board Assembly	803B-449 803BR-412
	Kelvin-Varley Resistor Printed Circuit Board Assembly	801B-403
	Converter/AC Range Switch Assembly	803B-438
T1	Transformer, power	801B-652

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
	Front Panel Assembly	803B-407 803BR-407 803B/AG-509
J1, J2, J3	Binding post, black	X219
	Binding post insulator, red	X217
	Binding post spacer	X220
	Shorting link	X221
	Knob, 1 inch with pointer	X231
	Knob, 1-1/2 inch without pointer	X207
	Knob, 1-1/2 inch with pointer	X234
	Knob, 1-1/2 inch with index line	X2085
	Voltage dial plates (cabinet model)	D3
	Voltage dial plates (rack model)	D2
B1	Standard cell	X223
C1	Capacitor, mylar, 0.47 uf, 10%, 600V	CP25
M1	Meter, 100-0-100 microamp (M32, M49 and M56 are interchangeable)	M32, M49, or M56
S1	Switch, power	ST5
S2	Switch, range, DC section	803B-812
S3	Switch, null	803B-816
S4	Switch, operate-calibrate	803B-814

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
S5	Switch, AC-DC polarity	803B-815
S6	Switch, voltage dial A	801B-819
S7, S8, S9	Switch, voltage dials B, C, and D	801B-820
S10	Switch, voltage dial E	801B-821
DS1, DS2, DS3, DS4	Lamps, decimal	X2051
R2	Potentiometer, dual section wirewound, 1K and 100 ohm, 10%, 2W	P1KD

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
	Reference Supply Printed Circuit Board Assembly without Tubes	803B-449 803BR-412
C101, C102	Capacitor, electrolytic, 20 uf, -10/+100%, 500V	CE52
C103	Capacitor, electrolytic, 4000 uf, -10/+100%, 15V	CE23
C104	Capacitor, paper, 0.1 uf, 20%, 400V	CP4
C105	Capacitor, mylar, 0.033 uf, 20%, 600V	CF19
C106	Capacitor, mylar, 0.1 uf, 20%, 600V	CF20
C107	Capacitor, ceramic, 0.01 uf, 20/+80%, 500V	CT18
CR101 thru CR103	Diode, silicon, 0.750 Amp, 600 PIV	RE18
CR104, CR105	Diode, silicon, 1 Amp, 50 PIV	RE8
Q1	Transistor, germanium, NPN, 2N214	2N214
Q2	Transistor, germanium, PNP, 2N1372	2N1372
R101	Resistor, composition, 1 Meg, 10%, 1/2W	EB1051
R102	Resistor, composition, 220K, 10%, 1/2W	EB2241
R104	Resistor, deposited carbon, 5K, 1%, 1/2W	DR49
R105	Resistor, deposited carbon, 135K, 1%, 1/2W	DR65
R106	Resistor, composition, 8.2K, 10%, 1/2W	EB8221

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
R107, R108	Resistor, composition, 50Ω, 1%, 1/2W	DR22
R109, R110	Resistor, composition, 270K, 10%, 1W	GB2741
R111	Resistor, composition, 22 Meg, 10%, 1/2W	EB2261
R112	Resistor, composition, 15 Meg, 10%, 1/2W	EB1561
R113	Resistor, composition, 10 Meg, 10%, 1/2W	EB1061
R114	Resistor, composition, 100K, 10%, 1W	GB1041
R115	Resistor, wirewound, 140K, 3%, 10W	R140KW
R116	Resistor, composition, 100K, 10%, 1/2W	EB1041
R117	Resistor, composition, 560K, 10%, 1W	GB5641
R118	Resistor, composition, 220K, 10%, 1/2W	EB2241
R119	Resistor, composition, 330Ω, 10%, 1/2W	EB3311
R120	Resistor, composition, 220K, 10%, 1W	GB2241
R121	Resistor, variable, wirewound, 5K, 20%, 1-1/4W	P5KM
R122	Resistor, composition, 560K, 10%, 1W	GB5641

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
R123	Resistor, wirewound, 386K, 0.5%, 1W	PR641
R124	Resistor, wirewound, 76K, 0.5%, 1/2W	PR59
R125	Resistor, composition, 82K, 10%, 1/2W	EB8231
V101	Vacuum tube, pentode, EL84/6BQ5	EB84/6BQ5
V102	Vacuum tube, voltage reference, OG3	OG3-2
V103	Lamp, neon glow, NE2X	X40A
V104	Vacuum tube, duo triode, 12AX7	12AX7-1
V105	Vacuum tube, duo triode, 12AX7	12AX7-1

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
	Null Detector Printed Circuit Board Assembly	803B-436
C201, C202	Capacitor, mylar, 0.1 uf, 20%, 200V	CF46
C203	Capacitor, mylar, 0.047 uf, 20%, 100V	CF47
C204	Capacitor, mylar, 0.47 uf, 20%, 200V	CF48
C205	Capacitor, electrolytic, 40 uf, -10/+100%, 6V	CE32
C206	Capacitor, ceramic, 0.001 uf, 20%, 3000V	CT16
C207	Capacitor, electrolytic, 10 uf, -10/+100%, 150V	CE67
C208	Capacitor, mylar, 0.1 uf, 20%, 200V	CF46
C209	Capacitor, mylar, 0.47 uf, 20%, 200V	CF48
C210	Capacitor, mylar, 0.1 uf, 20%, 200V	CF46
C211	Capacitor, mylar, 1 uf, 20%, 200V	CF50
C212	Capacitor, electrolytic, 200 uf, -10/+100%, 6V	CE30
C213	Capacitor, ceramic, 3.3 uuf, 15%, 1000V	CT10
C214A, C214B	Capacitor, dual electrolytic, 20/20 uf, -10/+50%, 450V	CE72
C215	Capacitor, electrolytic, 15 uf, -10/+150%, 6V	CE36
CR201	Diode, silicon 0.75 Amp, 600 PIV	RE18
CR202, CR203	Diode, silicon, 300 ma, 400 PIV	2E4

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
G1	Chopper, electronic, 60 cycle, SPDT	X2045
R201 thru R203	Resistor, composition, 1 Meg, 10%, 1/2W	EB1051
R204	Resistor, composition, 3.9 Meg, 10%, 1/2W	EB3951
R205	Resistor, composition, 2.7 Meg, 10%, 1/2W	EB2751
R206	Resistor, composition, 470K, 10%, 1/2W	EB4741
R207	Resistor, composition, 4.7K, 10%, 1/2W	EB4721
R208	Resistor, composition, 10K, 10%, 1/2W	EB1031
R209, R210	Resistor, composition, 1 Meg, 10%, 1/2W	EB1051
R112	Resistor, composition, 180K, 10%, 1/2W	EB1841
R213	Resistor, composition, 1K, 10%, 1/2W	EB1021
R214	Resistor, composition, 1 Meg, 10%, 1/2W	EB1051
R215	Resistor, composition, 27K, 10%, 1/2W	EB2731
R216	Resistor, composition, 560 Ω, 10%, 1/2W	EB5611
R217	Resistor, composition, 100 Ω, 10%, 1/2W	EB1011
R218	Resistor, deposited carbon, 93.1 Ω, 1%, 1/2W	DR822

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
R219	Resistor, variable wirewound, 10 Ω, 20%, 1-1/4W	P10
R220, R221	Resistor, composition, 3.3 K, 10%, 1/2W	EB3321
R222, R223	Resistor, composition, 47K, 10%, 2W	HB4731
R224	Resistor, composition, 2.7 Ω, 10%, 1/2W	EB27G1
R225, R226	Resistor, composition, 1K, 10%, 1/2W	EB1021
R227	Resistor, variable, wirewound, 5K, 20%, 1-1/4W	P5KM
R228, R229	Resistor, composition, 2.7K, 10%, 2W	HB2721
R231	Resistor, composition, 330K, 10%, 1/2W	EB3341
V201	Lamp, neon glow, type NE2E	X40B
V202	Vacuum tube, pentode, EF86/6267	EF86/6267
V203	Vacuum tube, triode-pentode, 6AW8	6AW8
V204	Vacuum tube, voltage reference, OA2	OA2

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
	Range Resistor Printed Circuit Board Assembly	803B-404 803BR-411 803B/AG-404
C301	Capacitor, mylar, 1 uf, 20%, 600V	CP33
C302	Capacitor, mylar, 2 uf, 20%, 200V	CF51
CR301	Zener diode, 9.2 to 9.6 volts at 10 ma (803B/AG and 803BR/AG. If replacement is required, replace both CR301 and R319 with Zener resistor pair 801B/G-410)	RE19
R301 thru R304	Resistor, deposited carbon, 10 Meg, 1%, 1W	DR80
R305	Resistor, deposited carbon, 9 Meg, 1%, 1W	DR78
R306	Resistor, deposited carbon, 900K, 1%, 1/2W	DR622
R307	Resistor, deposited carbon, 90K, 1%, 1/2W	DR513
R308	Resistor, deposited carbon, 9K, 1%, 1/2W	DR412
R309	Resistor, deposited carbon, 900Ω, 1%, 1/2W	DR824
R310	Resistor, deposited carbon, 100Ω, 1%, 1/2W	DR35
R311 thru R315	Resistor, composition, 22 Meg, 10%, 1/2W	EB2261
R316, R317	Resistor, wirewound, 125K, 0.1%, 1W	PR610
R318	Resistor, variable wirewound, 1K, 20%, 1-1/4W (803B and 803BR)	PIKM

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
R318	Resistor, variable wirewound, 3K, 20%, 1-1/4W (803B/AG and 803BR/AG)	P3KM
R319	Resistor, wirewound, 511.7Ω, 0.1%, 1/2W (803B and 803BR)	PR643
R319	Resistor, wirewound, 4844Ω, 0.1%, 1/2W (803B/AG and 803BR/AG. This is an average value. Optimum value is selected at factory to match zener diode)	PR654
R320, R321	Resistor, wirewound, 112.375K, 0.05%, 1W	PR615
R322	Resistor, composition, 27K, 10%, 1W	GB2731
R323	Resistor, variable, 500Ω, 10%, 1-1/4W	P500M
R324	Resistor, wirewound, 28.571K, 0.05%, 1/2W	PR515
R325	Resistor, wirewound, 22.5K, 0.1%, 1/2W	PR513
R326	Resistor, variable, 500Ω, 10%, 1-1/4W	P500M
R327	Resistor, wirewound, 2531.7Ω, 0.05%, 1/2W	PR49
R328	Resistor, wirewound, 24.75K, 0.1%, 1/2W	PR514
R329	Resistor, variable, 500Ω, 10%, 1-1/4W	P500M
R330	Resistor, wirewound, 250.31Ω, 0.05%, 1/2W	PR311
R331	Resistor, composition, 270Ω, 10%, 1/2W	EB2711

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
	Kelvin Varley Resistor PCB Assembly	801B-403
R401 thru R406*	Resistor, wirewound, 40K, 0.02%, 1/2W	PR512
R407 thru R417*	Resistor, wirewound, 8K, 0.02%, 1/2W	PR48
R418 thru R428*	Resistor, wirewound, 1.6K, 0.1%, 1/2W	PR46
R429 thru R439*	Resistor, wirewound, 320Ω, 0.1%, 1/2W	PR39
R440 thru R449*	Resistor, wirewound, 64Ω, 0.1%, 1/2W	PR24

*These resistors are factory matched for each instrument. When ordering, specify instrument serial number.

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
	Converter/AC Range Switch Assembly	803B-438
	Converter Assembly	803B-439
	AC Range Switch Assembly	803B-440
CR501, CR502	Diode, silicon, 60 ma, 40 PIV	RE7
	AC Range Switch Gain Adjust Assembly	803B-440-1
R503	Resistor, variable, wirewound, 5K, 20%, 1-1/4W	P5KM
R534	Resistor, variable, wirewound, 300Ω, 20%, 1-1/4W	P300B
	AC Range Switch Attenuator Assembly	803B-440-2
C501	Capacitor, variable, air, 0.8 to 4.5 uuf, 500V	CA4
C502	Capacitor, ceramic, 20 uuf, 2%, 600V	CT14
C523	Capacitor, variable, air, 0.8 to 4.5 uuf, 500V	CA4
C524	Capacitor, ceramic, 300 uuf, 5%, 600V	CT13
C525	Capacitor, ceramic, 82 uuf, 2%, 600V	CT36
R501	Resistor, metal film, 1 Meg, 1%, 1/2W	MR48
R502	Resistor, metal film, 122K, 1%, 1/2W	MR54
R533	Resistor, metal film, 500K, 1%, 1/2W	MR50
R535	Resistor, wirewound, 10.05K, 0.1%, 1/2W	PRA21
R543	Resistor, metal film, 500 K, 1%, 1/2W	MR50
R544	Resistor, composition, 390K, 10%, 1/2W	EB3941
	AC Range Switch Gain Network Assembly	803B-440-3
C504, C519	Capacitor, variable, air, 0.8 to 4.5 uuf, 500V	CA4
C520	Capacitor, ceramic, 3.3 uuf, 20%, 600V	CT55
C521	Capacitor, ceramic, 82 uuf, 2%, 600V	CT36

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
R504	Resistor, metal film, 1 Meg, 0.5%, 1/2W	MR53
R505	Resistor, composition, 47Ω, 10%, 1/2W	EB4701
R540	Resistor, metal film, 500K, 0.5%, 1/2W	MR52
R541	Resistor, variable, wirewound, 1K, 10%, 1/4W	PIKC
R542	Resistor, metal film, 48.75K, 0.5%, 1/2W	MR51
	AC Range Switch Assembly	803B-440-4
S2	Switch, range, AC section	803B-824
	Converter Assembly	803B-439-1
C505AB	Capacitor, electrolytic, 10-10 uf, -10/+50%, 500V	CE20
C506	Capacitor, ceramic, 0.005 uf, 20%, 500V	CT17
C507	Capacitor, ceramic, 300 uuf, 10%, 500V	CT28
C508	Capacitor, mylar, 0.47 uf, 20%, 200V	CF48
C509	Capacitor, mylar, 0.0068 uf, 20%, 400V	CF53
C510	Capacitor, ceramic, 0.001 uf, 20%, 3000V	CT16
C511	Capacitor, mylar, 0.47 uf, 20%, 200V	CF48
C512	Capacitor, paper, 0.1 uf, 20%, 400V	CP4
C513	Capacitor, electrolytic, 20 uf, -10/+100%, 50V	CE41
C514	Capacitor, ceramic, 2.2 uf, -0%, 3V	CT45
C515	Capacitor, mylar, 2 uf, 20%, 200V	CF51
C516	Capacitor, paper, 1 uf, 20%, 600V	CP33
C517	Capacitor, paper, 5 uf, 20%, 200V	CP36

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
C518	Capacitor, mylar, 2 uf, 20%, 200V	CF51
C522	Capacitor, electrolytic, 500 uf, -10/+100%, 3V	CE61
CR503	Diode, silicon, 300 ma, 400 PIV	2E4
R506, R507	Resistor, metal film, 68K, 5%, 2W	MR45
R508	Resistor, metal film, 56K, 5%, 2W	MR44
R509	Resistor, metal film, 100K, 5%, 5W	MR43
R510, R511	Resistor, composition, 3.3K, 10%, 1/2W	EB3321
R512	Resistor, composition, 220Ω, 10%, 1/2W	EB2211
R513	Resistor, composition, 270Ω, 10%, 1/2W	EB2711
R514	Resistor, composition, 1.8 Meg, 10%, 1/2W	EB1851
R515	Resistor, composition, 2.2 Meg, 10%, 1/2W	EB2251
R516	Resistor, composition, 15 Meg, 10%, 1/2W	EB1561
R517	Resistor, composition, 18 Meg, 10%, 1/2W	EB1861
R518	Resistor, composition, 1.8 Meg, 10%, 1/2W	EB1851
R519	Resistor, composition, 47Ω, 10%, 1/2W	EB4701
R520	Resistor, metal film, 120K, 5%, 2W	MR46
R521	Resistor, composition, 180Ω, 10%, 1/2W	EB1811
R522	Resistor, composition, 10K, 10%, 1/2W	EB1031
R523	Resistor, composition, 390Ω, 10%, 1/2W	EB3911
R524	Resistor, composition, 330K, 10%, 1/2W	EB3341

REFERENCE DESIGNATION	DESCRIPTION	FLUKE STOCK NO.
R525	Resistor, composition, 470K, 10%, 1/2W	EB4741
R526	Resistor, composition, 220K, 10%, 1/2W	EB2241
R527	Resistor, composition, 47Ω, 10%, 1/2W	EB4701
R528	Resistor, metal film, 150K, 5%, 2W	MR47
R529	Resistor, composition, 100K, 10%, 1W	GB1041
R530	Resistor, metal film, 47K, 5%, 5W	MR42
R531	Resistor, composition, 220Ω, 10%, 1/2W	EB2211
R532	Resistor, composition, 470K, 10%, 1/2W	EB4741
R536	Resistor, variable, wirewound, 500Ω, 10%, 1-1/4W	P500M
R537	Resistor, deposited carbon, 100K, 1%, 1/2W	DR61
R538	Resistor, wirewound, 21.6K, 0.1%, 1/2W	PR681
R539	Resistor, wirewound, 490Ω, 0.1%, 1/2W	PRA18

WARRANTY

The JOHN FLUKE MFG. CO., INC. warrants each instrument manufactured by them to be free from defects in material and workmanship. Their obligation under this Warranty is limited to servicing or adjusting an instrument returned to the factory for that purpose, and to making good at the factory any part or parts thereof; except tubes, fuses, choppers and batteries, which shall, within one year after making delivery to the original purchaser, be returned by the original purchaser with transportation charges prepaid, and which upon their examination shall disclose to their satisfaction to have been thus defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at a nominal cost. In this case, an estimate will be submitted before work is started, if requested.

If any fault develops, the following steps should be taken.

1. Notify the John Fluke Mfg. Co., Inc., giving full details of the difficulty, and include the Model number, type number, and serial number. On receipt of this information, service data or shipping instructions will be forwarded to you.

2. On receipt of the shipping instructions, forward the instrument prepaid, and repairs will be made at the factory. If requested, an estimate of the charges will be made before the work begins, provided the instrument is not covered by the Warranty.

SHIPPING

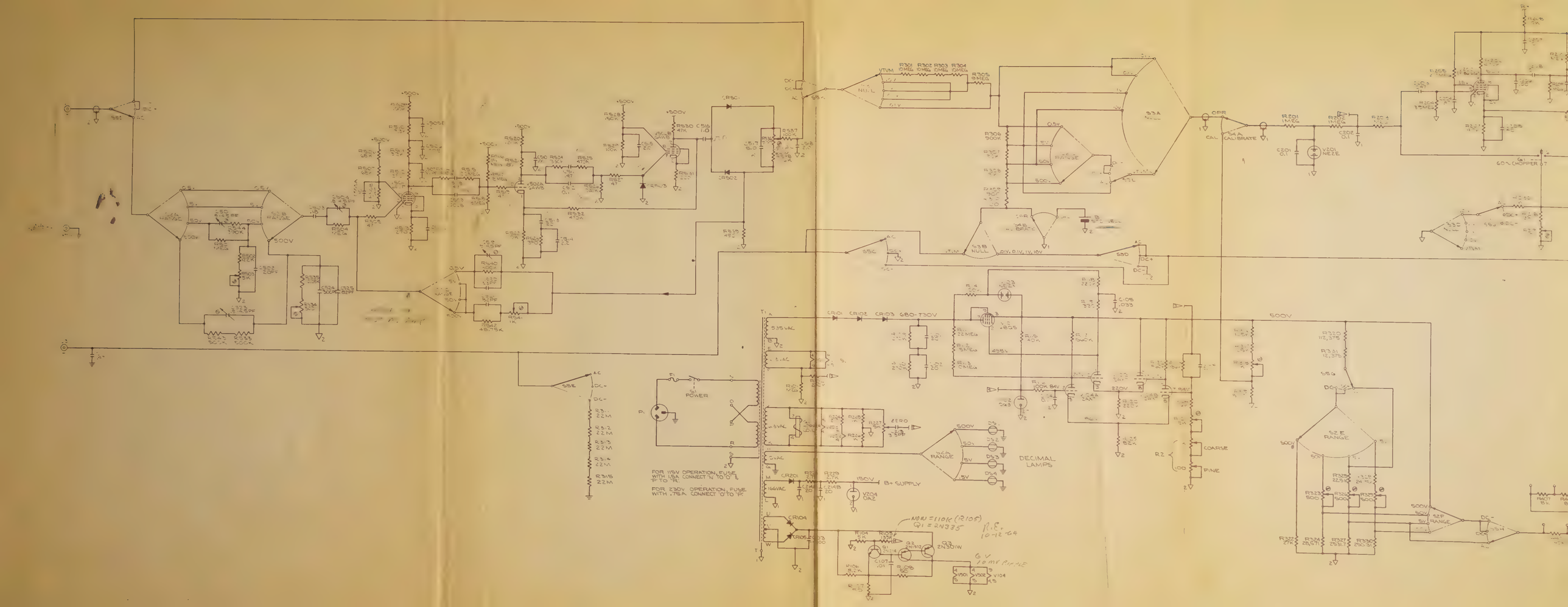
All shipments of John Fluke Mfg. Co., Inc. instruments should be made via Railway Express prepaid. The instrument should be shipped in the original packing carton; or if it is not available, use any suitable container that is rigid. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material.

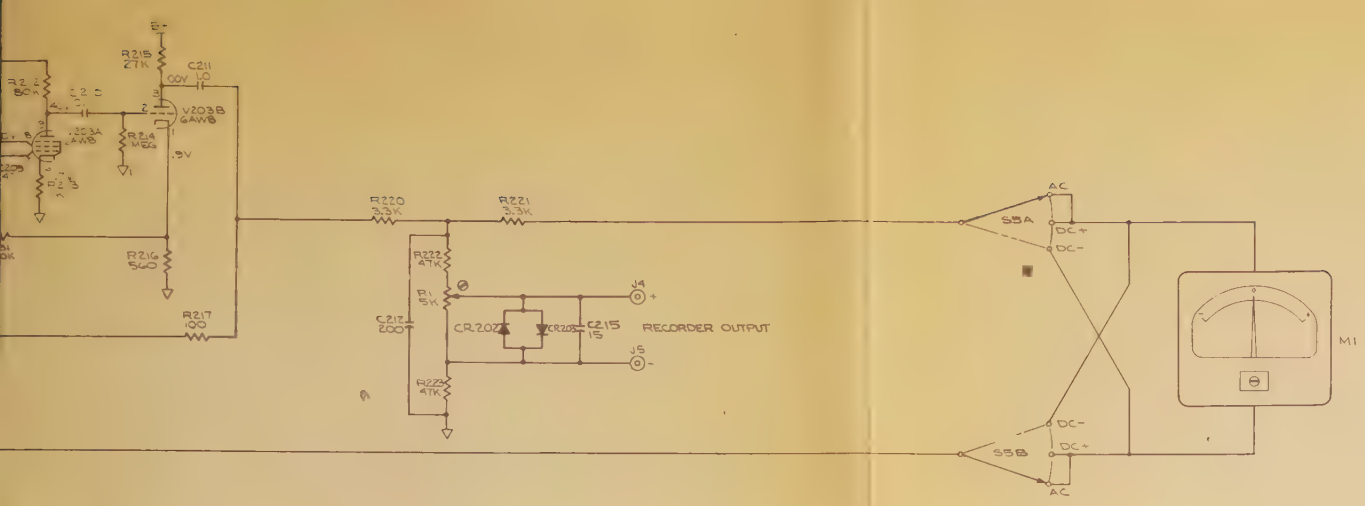
CLAIM FOR DAMAGE IN SHIPMENT

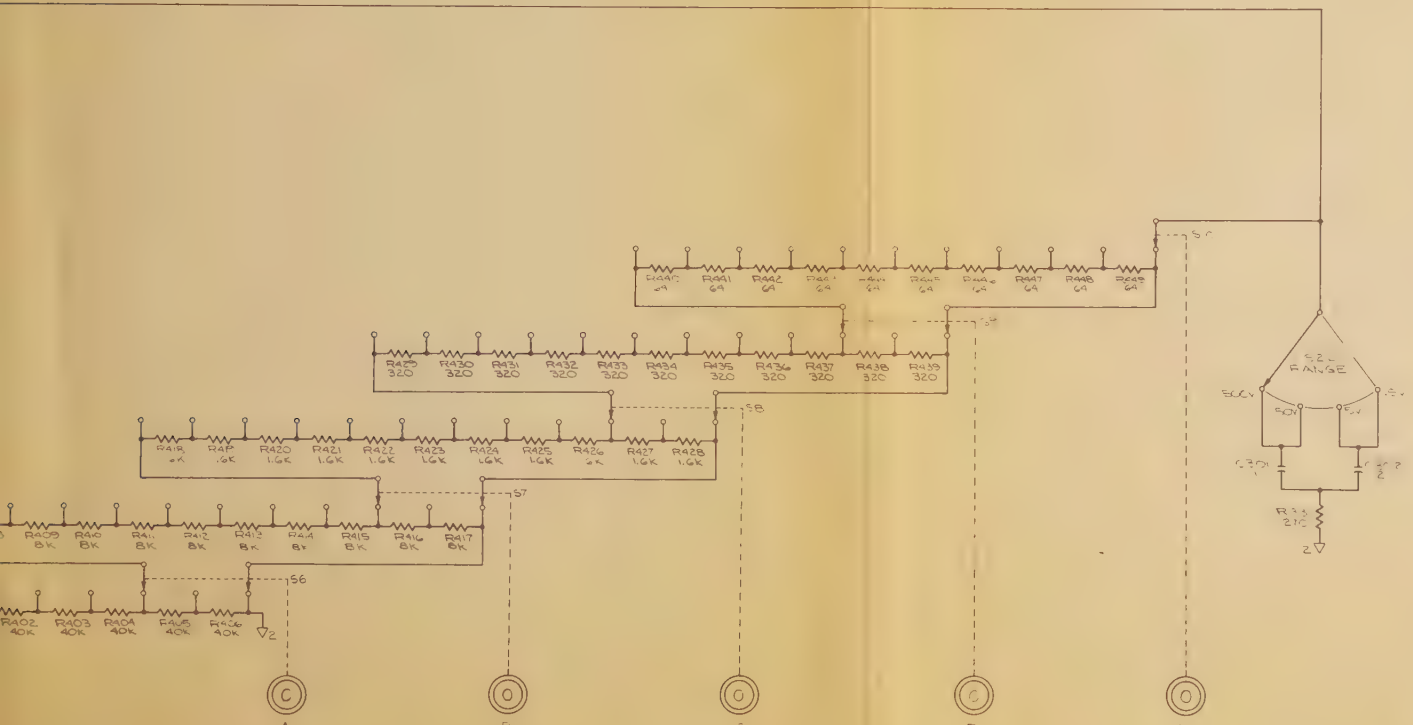
The instrument should be thoroughly inspected immediately upon receipt. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to John Fluke Mfg. Co., Inc. Upon receipt of this report you will be advised of the disposition of the equipment for repair or replacement. Include the model number, type number, and serial number when referring to this instrument for any reason.

The John Fluke Mfg. Co., Inc. will be happy to answer all application questions which will enhance your use of this instrument. Please address your requests to:

JOHN FLUKE MFG. CO., INC., P. O. BOX 7428, SEATTLE 33, WASHINGTON


FOR 115V OPERATION, FUSE WITH 1.5A CONNECT 'N' TO '0' & 'P' TO 'R'.
FOR 230V OPERATION, FUSE WITH .75A CONNECT '0' TO 'P'.
B+ SUPPLY
DECIMAL LAMPS
COARSE
FINE
CAL
CALIBRATE
60V CHOPPER
NOW = 110K (R2105)
Q1 = 2N335
R.E. 10-12-64
6V 10mV RIPPLE





VOTE:
ALL VOLTAGES MEASURED WITH VOLTAGE DIALS AT ZERO, RANGE SW. AT 500, NULL SW. AT VTVM, AND USING A 10 MEGOHM VTVM.
ALL VOLTAGES DC, EXCEPT WHERE NOTED.

1 AND 2 WILL DIFFER IN VOLTAGE BY PANEL READOUT

2 INDICATES REFERENCE AND SIGNAL INPUT COMMON.

1 INDICATES NULL DETECTOR COMMON

⊘ INDICATES INTERNAL ADJUSTMENT.

ALL FLAGNOTES WITH THE SAME NUMBER ARE CONNECTED.

SER 123 TO ON

FUNCTIONAL SCHEMATIC

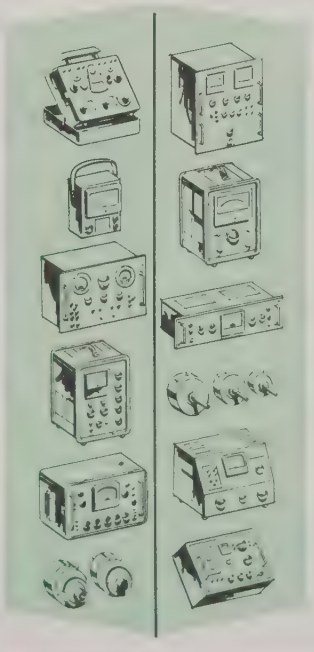
DIFFERENTIAL VOLTMETER
MODEL 803B

JOHN FLUKE MANUFACTURING COMPANY
MOUNTLAKE TERRACE, WASHINGTON

FLUKE

CATALOG F-162

INSTRUMENTS/COMPONENTS



ISSUE NO. 2

Page

- UNIVERSAL IMPEDANCE BRIDGE 2
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  - AC/DC Differential Voltmeter 4
  - AC Voltage Measuring Instruments 4
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JOHN FLUKE MFG. CO., INC.

P. O. Box 7428 • Seattle 33, Washington

ELECTRONICS FOR INDUSTRY...

Fluke is occupied in research, development, manufacture and design of advanced electronic instruments and components for laboratory and industrial use. Further, Fluke is dedicated to meet the needs of electronics in advancing technology by providing increased capabilities, backed by product-support in accuracy and long life.

JOHN FLUKE MFG. CO., INC.

Located in the Pacific Northwest . . . on the outskirts of Seattle, the Fluke company has grown in a few years from a small engineering firm to its present position as one of the leading manufacturers of precision electronic test and measuring instruments.

The company, which opened with two employees in 1949, moved to Seattle in 1952 where it occupies a new plant of over 34,000 sq. ft. in an industrial park north of the city.

In addition to an expanding line of new voltmeters and power supplies, Fluke has gone into production on a family of vernier and decade precision potentiometers. These new instruments and components are presented in this new short-form catalog for your consideration and evaluation.

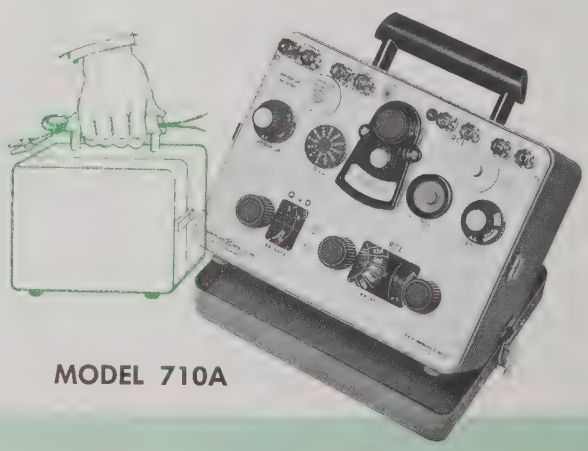
We welcome any inquiries you may make in seeking additional information on these new products or other Fluke instruments now in the line.

UNIVERSAL IMPEDANCE BRIDGE

FEATURES:

- Total weight under 10 lbs.
- High accuracy
- Wide range
- Direct in-line readout
- Plug-in frequency networks

The Model 710A is a compact, versatile, and easy to operate precision bridge. Internal ratio arm resistors and capacitance standard are selected for highest stability, consequently the 710A assures utmost in reliability and long life.



MODEL 710A

SPECIFICATIONS

Resistance:	0-12 megohms in 8 ranges
Accuracy:	±(0.1% + 1 dial division)
Capacitance:	0 to 1200 microfarads in 7 ranges
Accuracy:	± (0.2% + 1 dial division)
Inductance:	0 to 1200 henrys in 7 ranges
Accuracy:	±(0.3% + 1 dial division)
Dissipation Factor (D):	0 to 1.000 at 1 Kilocycle
Accuracy:	±(2% + 0.005)
Storage Factor (Q):	0 to 1000 at 1 Kilocycle
Accuracy:	± (2% + 0.005)

Switches:	All switches use silver alloy contacts
Input Power:	115/230 volts, 50 to 800 cycles, 12 watts
Dimensions:	Cabinet length, 9 inches; width, 7 inches; height, 6½ inches
Price:	$525.00 net F. O. B. factory.
Optional Accessories:	Plug-in RC networks tuned to the following frequencies for use in the detector and generator: 100 cps, 120 cps, 400 cps, 500 cps, 800 cps, 2 KC, 5 KC, 10 KC. Price per pair, $40.00.

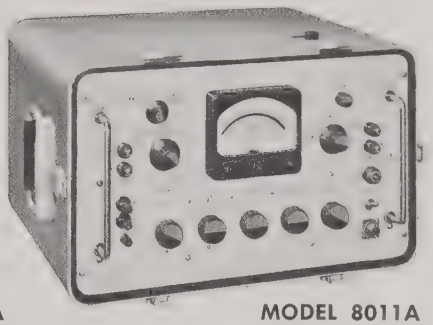
DC DIFFERENTIAL VOLTMETERS

MODEL 801B

NEW

MODEL 825A

NEW



MODEL 8011A

Fluke now offers a completely new line of DC Differential Voltmeters incorporating the latest in circuit design and manufacturing techniques. Features common to the three new units shown are:

- Infinite input impedance at null from 0-500 V DC (complete freedom from circuit loading error)
- In-line readout with automatic lighted decimal
- Positive or negative voltage measurement with equal ease (Models 801B and 825A)
- Recorder output (Models 801B and 825A)
- No zero controls
- Taut band suspension meter (eliminates meter stickiness problems)
- Flow-soldered glass epoxy printed circuit boards

Model No.	Input Voltage Range	Accuracy	Maximum Full Scale Sensitivity	Maximum Meter Resolution	Reference
801B	0-500V	±0.05%	10 mv	50 uv	Std. Cell } Zener Diode
825A	0-500V	±0.025%	1 mv	5 uv	Std. Cell } Optional
8011A	0-500V	±0.05%	10 mv	50 uv	Temp. controlled Zener diode

PRECISION DC DIFFERENTIAL VOLTMETER
MODEL 801B

DIMENSIONS: Cabinet Model—
9¾" wide x 13" high x 14" deep
Rack Model—
19" wide x 7" high x 14" deep

WEIGHT: Cabinet Model—24 pounds
Rack Model—21½ pounds

PRICE: Cabinet Model—$485.00
Rack Model—$505.00

PRECISION DC DIFFERENTIAL VOLTMETER
MODEL 825A

DIMENSIONS: Cabinet Model—
9¾" wide x 13" high x 14" deep
Rack Model—
19" wide x 7" high x 14" deep

WEIGHT: Cabinet Model—25 pounds
Rack Model—22 pounds

PRICE: Cabinet Model—$590.00
Rack Model—$610.00

MILITARIZED DC DIFFERENTIAL VOLTMETER
MODEL 8011A

DIMENSIONS: Combination case with cover—
19" wide x 11½" high x 19½" long

WEIGHT: 57 pounds

PRICE: $1,745.00

PRECISION VOLTAGE DIVIDERS

Designed for use with the Fluke Model 800 Series Differential Voltmeter, Fluke precision voltage dividers provide high accuracy measurements to 30,000 V DC. All units have zero center panel meters to indicate polarity and approximate magnitude of unknown high voltage. All models draw 1 ma current at maximum input.

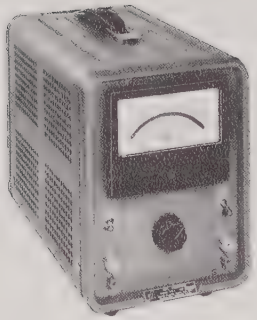
MODEL 80A

MODEL 80C

Model No.	Maximum Input Voltage	Total Resistance	Division Ratio 500 V Out	Division Ratio 1V Out	Division Ratio Accuracy	Price
80A-1	1 KV	1M	2:1	—	±0.015%	$ 100.00
80A-2	2 KV	2M	4:1	—	±0.015%	110.00
80B-5	5 KV	5M	10:1	5,000:1	±0.01%	225.00
80B-10	10 KV	10M	20:1	10,000:1	±0.01%	350.00
80C-15	15 KV	15M	30:1	15,000:1	±0.01%	720.00
80C-20	20 KV	20M	40:1	20,000:1	±0.01%	845.00
80C-25	25 KV	25M	50:1	25,000:1	±0.01%	970.00
80C-30	30 KV	30M	60:1	30,000:1	±0.01%	1,095.00

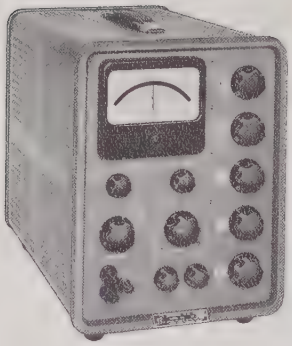
AC VOLTAGE MEASURING INSTRUMENTS—SEE NEXT PAGE

AC VOLTAGE MEASURING INSTRUMENTS



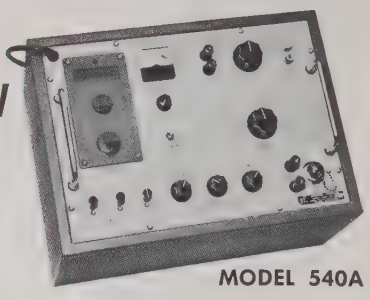
NEW

MODEL 910A



MODEL 803

NEW



MODEL 540A

PRECISION AC VOLTMETERS

Three of the most well accepted and proven methods for obtaining highly accurate AC voltage measurements have been incorporated by Fluke to supply industry and the military with instruments well suited to cover a broad range of sensitivity, bandwidth and accuracy requirements. The electronics engineer may now select either the Model 910A Broadband True RMS voltmeter with panel meter readout for 1% accuracy, the Model 803 differential voltmeter with in-line 5-dial readout for 0.2% accuracy or the Model 540A Thermal Transfer Standard with Galvanometer readout for 0.02% accuracy.

Unique simplified design in each instrument provides the user with ease of operation plus long term trouble free operation for maximum dollar value at minimum cost.

TRUE RMS VOLTMETER

The Fluke Model 910A True RMS Voltmeter is a new basic instrument which combines true RMS response with 1.0% accuracy over a broad frequency range. Its true RMS response, by definition, guarantees that the accuracy of the indicated reading, of virtually any waveform, is maintained regardless of its amplitude characteristics.

MODEL 910A

SPECIFICATIONS

Voltage Range:	100 uv to 300 v in twelve ranges
Decibel Range:	−72 to +52 dbm in twelve ranges
Frequency Response:	10 CPS to 7 MC
Accuracy:	±1% of full scale 50 CPS to 800 KC
	±2% of full scale 20 CPS to 2 MC
	±3% of full scale 20 CPS to 3.5 MC
	±5% of full scale 10 CPS to 7.0 MC
Crest Factor:	Three at full scale. Proportionately higher for readings of less than full scale
Input Impedance:	10 megohms shunted by 30 uuf on ranges from 0.001 v to 0.300 v
	10 megohms shunted by 15 uuf on ranges from 1.0 to 300 v
Amplifier:	Output terminals provide approximately 100 mv RMS at full scale regardless of range
Dimensions:	Cabinet Model—7¼" wide x 10½" high x 15" deep
	Rack Model—19" wide x 5¼" high x 13¼" deep
Price:	Cabinet Model—$545.00
	Rack Model—$565.00

AC/DC DIFFERENTIAL VOLTMETER

The Fluke Model 803 Differential Voltmeter, employing the differential measurement technique, provides versatility in measuring either AC or DC to high orders of accuracy.

MODEL 803

SPECIFICATIONS

Voltage Range:	DC—0-500 volts
	AC—0.05-500 volts
Accuracy:	DC—±0.05% of input voltage from 0.1-500 v. ±0.1% of input voltage or 50 uv, whichever is greater from 0 to 0.1 v
	AC—±0.2% of input voltage from 0.5-500 v over 30 CPS to 10 KC frequency range. Reduced accuracy from 0.05-0.5 v
Input Impedance:	DC—Infinite at null. AC—1 megohms shunted by approx. 25 uufd
Reference:	Standard cell, zener reference optional at additional cost
Dimensions:	Cabinet Model—9¾" wide x 13" high x 16" deep
	Rack Model—19" wide x 8¾" high x 17-5/16" deep
Weight:	Cabinet Model—30 pounds
	Rack Model—38 pounds
Price:	Cabinet Model—$875.00
	Rack Model—895.00

AC/DC THERMAL TRANSFER STANDARD

The Fluke Model 540A Thermal Transfer Standard provides extreme accuracy for applications requiring measurement capability equal to the limits of accuracy certified by the National Bureau of Standards.

MODEL 540A

SPECIFICATIONS

Voltage Ranges: 0.5, 1, 2, 3, 5, 10, 20, 30, 50,
Transfer Accuracy: 100, 200, 300, 500, 1000 volts

Range	Frequency	AC/DC Difference
0.5 v	5 cps—100 kc	±0.02%
	5 cps—500 kc	±0.05%
1v-10 v	5 cps—500 kc	±0.02%
20v-50 v	5 cps—100 kc	±0.02%
	5 cps—500 kc	±0.2 %
100v-500 v	5 cps—50 kc	±0.03%
1000 v	5 cps—20 kc	±0.05%

Calibration:	Traceable to NBS certification to 50 KC
Transfer Input Impedance:	200 ohms/volt
Galvanometer:	Built-in reflecting type; binding posts and switch provided for external galvanometer
Galvanometer Resolution:	0.02%/ millimeter at nominal range voltage
Search Meter:	This circuit is provided to select the proper voltage range thereby minimizing the possibility of thermocouple overload
Dimensions:	10¾" wide x 8½" high x 14½" long
Weight:	11½ pounds
Price:	$795.00

We invite you to write for information on new Fluke Model A55 thermal converters to extend the range of model 540A to 50 MC.

POWER SUPPLIES

Field tested and proven in the fields of production testing, general laboratory development and nuclear research, the Fluke line of power supplies are widely accepted as reliable standards. Ranging in output from 0 to 10 Kilovolts and 0 to 500 milliamperes, these units provide the user with the needed high orders of stability, regulation and calibration accuracy for virtually every application.

These are a few of the applications where Fluke power supplies can best assist you: • DC instrument calibration • power traveling wave tubes where R. F. phase jitter must be minimized • power Klystron tubes when frequency stability is essential • power source for pulse transmitters • nuclear research applications where high stability and low ripple are important • charging capacitor banks for high voltage work • other laboratory and industrial applications requiring accuracy and dependability.

GENERAL PURPOSE-DC LABORATORY POWER SUPPLIES:

Suggested applications: Circuit development, production checkout, meter calibration, and general laboratory applications.

*Model 406 also available as rack mounted model 406R
8¾" high x 19" wide x 16¾" deep
Weight—41 lbs. Price—$305.00

**Model 407D also available as rack mounted model 407DR
19" wide x 8¾" high x 16¾" deep
Weight—48 lbs. Price—$355.00

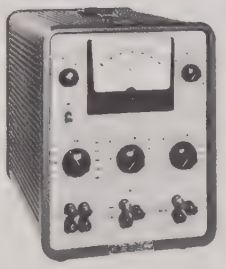
MODEL	VOLTAGE	CURRENT	REGULATION LINE	REGULATION LOAD	STABILITY PER HOUR	STABILITY PER DAY	CALIBRATION ACCURACY	MAX. RIPPLE RMS	RESOLUTION	PRICE
*406	0-530 v	0-100 ma	0.01%	0.01%	0.01%	0.05%	—	1 mv	2 mv	$ 285.00
**407D	0-555 v	0-300 ma	0.005%	0.01%	0.01%	0.05%	0.5%	500 uv	2 mv	335.00
PRECISION CALIBRATORS										
301E	1.02-512 v	0-300 ma	0.005%	0.005%	0.005%	0.01%	0.1%	2 mv	500 uv	695.00
301C	1.02-1012 v	0-400 ma	0.005%	0.005%	0.005%	0.01%	0.1%	2 mv	500 uv	985.00
334B	0-3111 v	0-400 ma	0.002%	0.005%	0.005%	0.01%	0.03%	1 mv	50 uv	2,650.00

CONSTANT CURRENT POWER SUPPLY:

Featuring 0.1 microamp resolution coupled with high calibration accuracy and excellent long term stability, Model 351A is particularly useful for calibration and testing of instruments, microammeters and milliammeters, etc.

MODEL	VOLTAGE	CURRENT	REGULATION LINE	REGULATION LOAD	STABILITY PER HOUR	STABILITY PER DAY	CALIBRATION ACCURACY	MAX. RIPPLE RMS	RESOLUTION	PRICE
351A	0-100 v	1 ua-100 ma	0.01%	0.01%	0.005%	0.01%	0.05%	0.05%	0.1 ua	$845.00

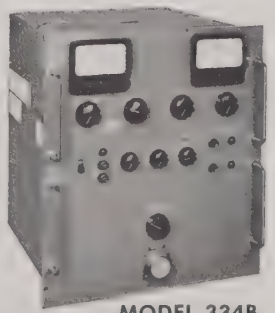
MODEL 406


MODEL 407D

FLUKE

MODEL 301E

MODEL 301C


MODEL 334B

NEW

MODEL 351A

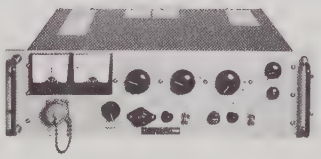
POWER SUPPLIES CONTINUED NEXT PAGE

HIGH VOLTAGE POWER SUPPLIES

Suggested applications: Power photomultiplier tubes and ionization chambers . . . for research and development of traveling wave tubes and backward wave oscillators . . .

MODEL	VOLTAGE	CURRENT	REGULATION LINE	REGULATION LOAD	STABILITY PER HOUR	STABILITY PER DAY	CALIBRATION ACCURACY	MAX. RIPPLE RMS	RESOLUTION	PRICE
409A	170-1530 v	0-3 ma	0.01%	0.4%	—	0.02%	—	0.002%	85 v steps	$ 335.00
412A	500-2010 v	0-15 ma	0.01%	0.01%	0.005%	0.03%	0.25%	5 mv	10 mv	455.00
413A	0-3111 v	0-20 ma	0.001%	0.001%	0.005%	0.03%	0.25%	150 uv	1.5 mv	695.00
405	600-3100 v	0-15 ma	0.01%	0.005%	0.005%	0.05%	0.5%	5 mv	10 mv	595.00
408A	500-6010 v	0-20 ma	0.01%	0.01%	0.005%	0.03%	0.25%	5 mv	10 mv	695.00
410A	1000-10,010 v	0-10 ma	0.01%	0.01%	0.005%	0.05%	0.25%	5 mv	10 mv	1,095.00

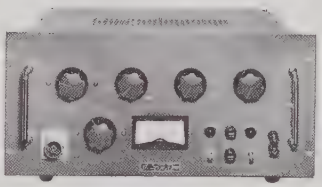
MODEL 409A



MODEL 413A

MODEL 412A

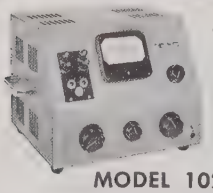
MODEL 405



MODEL 408A

MODEL 410A

VAW METER



MODEL 102

. . . measure Volts, Amps, Watts

The jf Model 102 VAW Meter has a maximum true power sensitivity of 225 microwatts and will measure up to 18 kilowatts over the frequency range of 20 CPS to 100 KC. With a one megohm input resistance and a shunt drop of only 45 millivolts full scale, the Model 102 generally produces negligible insertion loss effects on the circuit under test. The VAW Meter is ideally suited to measuring true power consumed by a wide variety of loads including both linear and non-linear elements such as servo components, transformers, rectifiers and substantially any power-consuming circuit configuration.

SPECIFICATIONS

Voltage full scale: 1.5—600 v
Current full scale: 1.5 ma—30 Amps.
Power: 225 uw to 18 KW

PRICES

Cabinet model—**535.00**
Rack model—**585.00**
Current shunts—**$20.00** ea.

Power Factor Range	Frequency Response	Accuracy	Input Impedance
1.0	20 CPS—100 KC	3%	1 megohm
0.1	20 CPS— 20 KC	3%	25 uufd
0.1	20 KC — 40 KC	5%	———

RECORDER

MODEL A-70

Monitoring of voltages measuring by the Fluke 800 series differential voltmeters is readily possible using the Model A-70 Potentiometric Recorder. All standard 800 series voltmeters are provided with recorder output terminals to facilitate use of this convenient accessory.

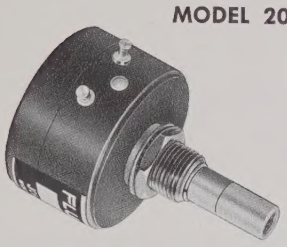
ELECTRICAL SPAN:	10 MV DC
SPAN STEP RESPONSE TIME:	0.5 seconds or less
RATIO ACCURACY:	0.5% of span plus 10 uv
CHART SPEEDS:	0.75, 1.5, 3, 6, or 12 in./min. or in./hr.
PRICE:	$745.00

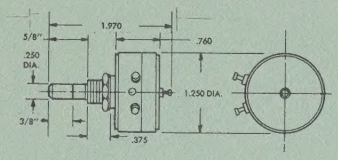
PRECISION POTENTIOMETERS

The John Fluke Vernier Potentiometers combine the advantages of high resolution, linearity and AC response in a small case at moderate prices. All models of the 20 series provide resolution better than conventional ten-turn potentiometers in less than 1½ turns. Resistance ranges from 100 ohms to 100,000 ohms and power ratings from 2 watts to 5 watts. All Fluke potentiometers utilize wire having a temperature coefficient of less than ±0.002% per degree Centigrade.

HIGH RESOLUTION VERNIER POTENTIOMETER

MODEL 20A



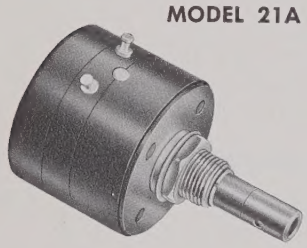


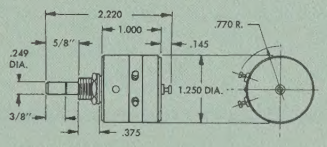
Resistance range, ohms	100 to 25K
Standard resistance tolerance	±5%
Available at	±1%
Min. practical resistance tolerance	±0.5%
Resolution 1K & above better than	0.02%
Standard linearity	±0.5%
Available at	±0.25%
Frequency range	DC to 100 KC
Power rating, watts	2 at 20°C
derated to	0 at 100°C
Equivalent noise resistance	less than 100 ohms
Electrical Rotation	550° ±10°
Mechanical rotation	562° ±10°
Price	$8.50

20A

HIGH RESOLUTION VERNIER POTENTIOMETER

MODEL 21A



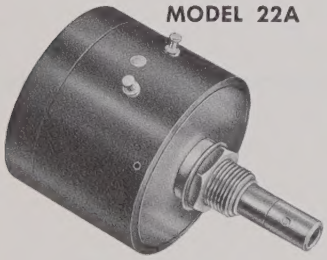


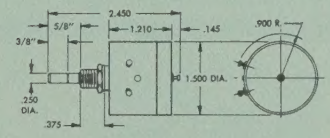
Resistance Range, ohms	30K, 40K and 50K
Standard Resistance Tolerance	±5%
Available at	±1%
Min. practical resistance tolerance	±0.5%
Resolution 30K and above better than	0.008%
Standard linearity	±0.5%
Available to	±0.25%
Frequency range	DC to 100 KC
Power rating, watts	3 at 20°C
derated to	0 at 100°C
Equivalent noise resistance	less than 100 ohms
Electrical rotation	550° ±10°
Mechanical rotation	562° ±10°
Price	$10.00

21A

HIGH RESOLUTION VERNIER POTENTIOMETER

MODEL 22A



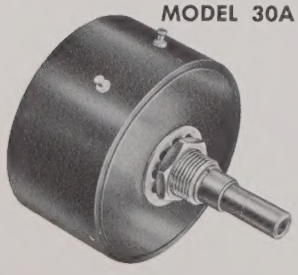


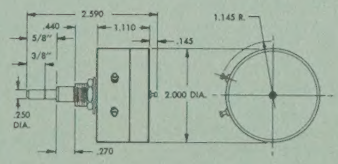
Resistance range, ohms	1K to 100K
Standard resistance tolerance	±5%
Available to	±1%
Min. practical resistance tolerance	±0.5%
Resolution 1K and above better than	0.02%
Standard linearity	±0.5%
Available to	±0.25%
Frequency range	DC to 100 KC
Power rating, watts	5 at 20°C
derated to	0 at 100°C
Equivalent noise resistance	less than 100 ohms
Electrical rotation	550° ±10°
Mechanical rotation	562° ±10°
Price	$15.00

22A

HIGH RESOLUTION VERNIER POTENTIOMETER

MODEL 30A





The Fluke Model 30A vernier potentiometer provides resolution better than available in 40 turn helical potentiometers in less than 2½ turns.

Resistance range, ohms	1K to 100K
Standard resistance tolerance	±5%
Available to	±1%
Min practical resistance tolerance	±0.5%
Resolution: 1 part in 50,000 or better than	0.002%
Standard linearity	±0.5%
Available to	±0.25%
Frequency range	DC to 100 KC
Power rating, watts	5 at 20°C
derated to	0 at 100°C
Equivalent noise resistance	less than 100 ohms
Electrical rotation	830° ±15°
Mechanical rotation	848° ±15°
Price	$30.00

30A

ACCESSORIES: COMPATIBLE KNOBS AND RESETTABLE DIALS AVAILABLE.

NEW POTS—NEW SOURCE

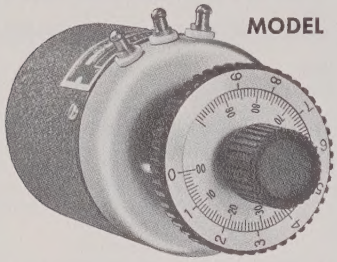
DECADE POTENTIOMETERS—NEXT PAGE

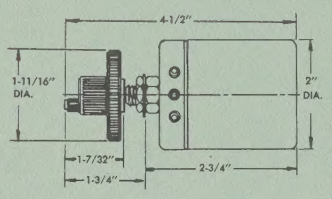
DECADE POTENTIOMETERS

John Fluke Decade Potentiometers are a family of precision voltage dividers consisting of a combination of high accuracy fixed resistors and a precision wirewound potentiometer. This combination provides linearity ranging from 1 part in 1000 to better than 1 part in 20,000 and resolution from 0.02% to more than 0.0002%. Wire having a Temperature Coefficient of less than ±0.0015% per degree centigrade is used in all Fluke Decade Potentiometers.

HIGH RESOLUTION DECADE POTENTIOMETER

MODEL 40A



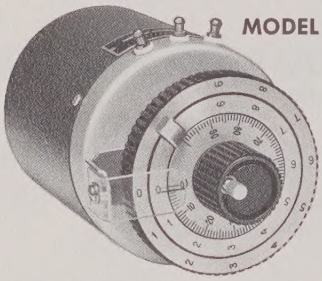


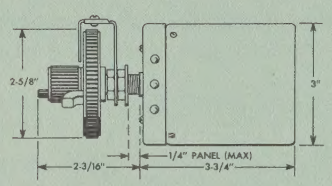
Voltage ratio in 0.001 steps	0 to 1.000
Standard input resistance, ohms (Other values available as specials)	1K to 10K
Standard resistance tolerance (full scale)	±0.5%
Resolution, better than	0.02%
Standard linearity (full scale)	±0.1%
Power rating, watts	3 at 20°C
Frequency response	DC to 100 KC
Available with 360° rotation	
Price	$48.00

40A

HIGH RESOLUTION DECADE POTENTIOMETER

MODEL 50A



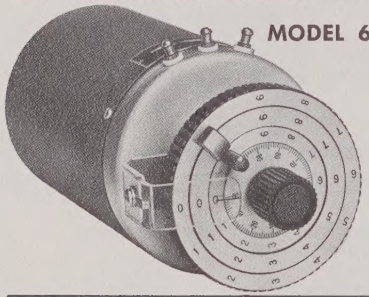


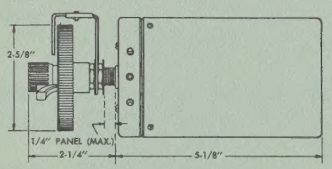
Voltage ratio in 0.0001 steps		0.0000 to 1.0000
Standard input resistance, ohms (Other values available as specials)		1K, 10K, 20K and 100K
Standard resistance tolerance (full scale)		±0.05%
Resolution, better than		0.002%
Standard linearity (full scale)		±0.01%
Frequency range		DC to 100 KC
Power rating, watts		5 at 20°C
Available with either stacked or coplaner dials.		
Also available with 360° rotation.		
Price	1K, 10K, and 20K	$ 90.00
	100K	$100.00

50A

HIGH RESOLUTION DECADE POTENTIOMETER

MODEL 60A





Voltage ratio in 0.00001 steps		0.00000 to 1.0000
Standard input resistance, ohms (Other values available as specials)		10K and 100K
Standard resistance tolerance (full scale)		±0.05%
Resolution, better than		0.0002%
Standard linearity (full scale)		±0.005%
Frequency range		DC to 100KC
Power rating, watts		5 at 20°C
Available with either stacked or coplaner dials.		
Also available with 360° rotation.		
Price	10K	$145.00
	100K	$155.00

60A

FLUKE

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